

Application No. 10/551,711
Second Preliminary Amendment

Docket No.: 209593-101226

AMENDMENTS TO THE CLAIMS

1- 29. (Canceled)

30. (New) A fluid pressure disturbance damping arrangement for a fluid-driven actuation device including an actuator, a fluid pump, a fluid supply line for delivering fluid from the pump to the actuator at relatively high pressure, and a fluid return line for delivering fluid from the actuator to the pump at relatively low pressure, the damping arrangement comprising:

an elongate flexible damping hose in fluid communication with at least one of the supply and return lines, the hose having a longitudinal axis and about the axis a peripheral wall defining, in a cross-sectional plane perpendicular to the axis, a non-circular area of magnitude related to pressure exerted on the peripheral wall by a contained fluid, the peripheral wall being responsive to impulsive or vibrational pressure disturbances in the contained fluid to deform and restore locally changing the shape of the cross-section area defined thereby to dissipate energy associated with the pressure disturbance.

31. (New) The damping arrangement according to claim 30, wherein the peripheral wall of the damping hose is arranged to define different cross-sectional areas at different longitudinal positions.

32. (New) The damping arrangement according to claim 30, wherein the peripheral wall is configured to change shape in response to contained fluid pressure disturbances without storing disturbance energy solely as elastic stretching of the peripheral wall.

33. (New) The damping arrangement according to claim 30, wherein the damping hose has a wall construction including interwoven strands configured to be displaced relative to each other during deformation of the cross-sectional shape of the hose and to absorb deformation energy as frictional loss between the strands.

34. (New) The damping arrangement according to claim 30, wherein for a predetermined length of hose, the length of the peripheral wall is substantially fixed.

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35. (New) The damping arrangement according to claim 30, wherein the damping hose has two opposing first wall parts normally closer together than two orthogonally disposed opposing second wall parts.

36. (New) The damping arrangement according to claim 35, wherein in the absence of fluid pressure the first wall parts are arranged to contact each other.

37. (New) The damping arrangement according to claim 30, wherein in the absence of fluid pressure the peripheral wall has a shape defining a generally elliptical cross-section.

38. (New) The damping arrangement according to claim 30, wherein the damping hose is provided in fluid communication with the return line of the fluid actuation device adjacent the actuator.

39. (New) The damping arrangement according to claim 30, wherein the damping hose is located in and passes fluid of the return line of the actuation device adjacent the actuator.

40. (New) The damping arrangement according to claim 30, wherein the damping hose is of fixed length.

41. (New) The damping arrangement according to claim 30, wherein the fluid driven actuation device is a vehicle power-assisted steering rack and the damping hose is carried along its length by the steering rack.

42. (New) A fluid driven actuation device including an actuator, a fluid pump, a fluid supply line for delivering fluid from the pump to the actuator at relatively high pressure, a fluid return line for delivering fluid from the actuator to the pump at relatively low pressure, and a pressure disturbance damping arrangement in fluid communication with at least one of the supply and return lines, the damping arrangement comprising:

an elongated flexible damping hose having a longitudinal axis and about the axis a peripheral wall defining, in a cross-sectional plane perpendicular to the axis, a non-circular area of magnitude related to pressure exerted on the peripheral wall by a contained fluid, the peripheral wall being operable in response to impulsive or vibrational pressure disturbances in the contained fluid to deform and restore locally changing the shape of the cross-section area

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defined thereby to dissipate energy associated with the pressure disturbance.

43. (New) The fluid driven actuation device according to claim 42, wherein the damping hose is located in the return line adjacent the actuator, providing a passage for return of the contained fluid from the actuator to the fluid pump.

44. (New) The fluid driven actuation device according to claim 42, wherein the damping hose of the pressure disturbance damping arrangement is of fixed length.

45. (New) The fluid driven actuation device according to claim 42, wherein the damping hose is supported along its length by the actuator.

46. (New) The fluid driven actuation device according to claim 42, wherein the peripheral wall is configured to change shape in response to contained fluid pressure disturbances without storing disturbance energy solely as elastic stretching of the peripheral wall.

47. (New) The fluid driven actuation device according to claim 42, wherein the damping hose has a wall construction including interwoven strands configured to be displaced relative to each other during deformation of the cross-sectional shape of the damping hose and to absorb deformation energy as frictional loss between the strands.

48. (New) The fluid driven actuation device according to claim 42, wherein for a predetermined length of hose, the peripheral length of the hose wall is substantially fixed.

49. (New) The fluid driven actuation device according to claim 42, wherein the hose has two opposing first wall parts normally closer together than two orthogonally disposed opposing second wall parts.

50. (New) The fluid driven actuation device according to claim 42, wherein in the absence of fluid pressure the peripheral wall has a shape defining a generally elliptical cross-section.

51. (New) The fluid driven actuation device according to claim 50, wherein in the absence of fluid pressure the first wall parts are arranged to contact each other.

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52. (New) The fluid driven actuation device according to claim 42, wherein the actuator includes a power assisted steering mechanism for a road vehicle.

53. (New) The fluid driven actuation device according to claim 42, wherein the actuator comprises a steering rack or box having a casing mounted on the vehicle.

54. (New) The fluid driven actuation device according to claim 53, wherein the damping hose has its peripheral wall in contact with the casing of the steering rack or box for substantially the entire length of the damping hose.

55. (New) The fluid driven actuation device according to claim 42, wherein the contained fluid is a hydraulic fluid and the damping hose is in the return line.

56. (New) A method of damping disturbances in fluid pressure within a fluid-driven actuation device including an actuator, a fluid pump, a fluid supply line for delivering fluid from the pump to the actuator at relatively high pressure, and a fluid return line for delivering fluid from the actuator to the pump at relatively low pressure, the method comprising:

coupling to at least one of the supply and return lines an elongated flexible damping hose having a longitudinal axis and about the axis a peripheral wall defining, in a cross-sectional plane perpendicular to the axis, a non-circular area of magnitude related to pressure exerted on the peripheral wall by a contained fluid, and causing said peripheral wall to deform and restore locally in response to impulsive or vibrational pressure disturbances in the contained fluid changing the shape of the cross-section area defined thereby and dissipating energy associated with the pressure disturbance.

57. (New) The method according to claim 56 further comprising inserting the damping hose in the actuation device return line adjacent the actuator.

58. (New) The method according to claim 56 further comprising supporting the damping hose with its peripheral wall in contact with a casing of the actuator for substantially the whole length of the damping hose.